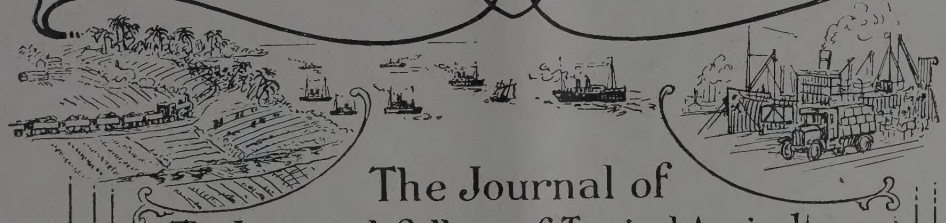
TROPICAL AGRICULTURE



The Journal of
The Imperial College of Tropical Agriculture

THIS FOUNDATION
STONE OF THE
IMPERIAL COLLEGE
OF TROPICAL
AGRICULTURE
WAS LAID BY
SIR SAMUEL WILSON
K.C.M.G. K.B.E. C.B.
GOVERNOR OF
TRINIDAD & TOBAGO
ON JANUARY 14TH 1924
"VIA COLENDI HAUD FACILIS"

SUPPLEMENT—THE NEW COLLEGE BUILDING

The New College Building after the design by Major H. C. Corlette, O.B.E., F.S.A., F.R.I.B.A.

SUPPLEMENT TO

TROPICAL AGRICULTURE

THE OFFICIAL JOURNAL OF THE
IMPERIAL COLLEGE OF TROPICAL AGRICULTURE

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THE IMPERIAL COLLEGE OF TROPICAL AGRICULTURE.

(1) Sir Francis Watts, K.C.M.G., Sc.D., *Principal Emeritus.*

The object of establishing the Imperial College of Tropical Agriculture was to enable instruction of a nature somewhat similar to that which is now so widely given in Agricultural Colleges throughout the world in connection with the crops of temperate climates to be given to young men about to engage in agricultural work in the tropics. While there are abundant facilities for the former there are few relating to the latter, or tropical aspect of the case.

For many years much had been done in connection with the Imperial and local Departments of Agriculture in the West Indies in the way of training a number of young men for agricultural duties in this region, but this was only done incidentally and mainly in order to provide men for departmental posts ; it was felt, therefore, that the time had arrived when the work of training young men for agricultural work in the tropics should be put on a more definite and regular basis. The West Indian Agricultural College, whose title was changed at an early date to that of the Imperial College of Tropical Agriculture, was the outcome.

When the scheme was publicly propounded in 1919 it was most favourably received in the West Indian Colonies with the result that the attention of the Colonial Office was seriously directed to the matter and, in consequence, Lord Milner, then Secretary of State for the Colonies, appointed a Committee to consider and report on the subject. The Committee's report being favourable, steps were taken by the Secretary of State to obtain the considered views of the West Indian Colonies with regard to the foundation of the proposed College and to elicit their support. The replies were of a sufficiently encouraging nature to induce Lord Milner to invite the Committee which he had appointed to continue its work and to put forward definite proposals for the establishment of the College.

It may be briefly stated that the Committee made recommendations relating to the constitution and management of a College, to be established in Trinidad, which recommendations were adopted and the College was duly opened by His Excellency Sir Samuel Wilson, K.C.M.G., K.B.E., the Governor of the Colony on October 16, 1922.

The College is supported financially by grants from the Imperial Government and the Colonies concerned, the Imperial Government giving a sum of £15,000, the payment of which is spread over a period of five years, while the Colonies of Trinidad, Barbados, the Windward Islands and the Leeward Islands agreed to make annual contributions equivalent approximately to one-half of one per cent. of their revenues towards its maintenance, contributions for this purpose being made also by the Colonies of Bermuda and British Guiana. In addition to this the planters of Trinidad generously agreed to raise a sum of £50,000 towards the building and equipment of the College ; this was raised by a cess imposed on agricultural products including cacao, sugar, coconuts and other products, collected by the Government under legislative sanction and handed over to the College authorities. Similarly a sum of £1,000 was raised by the Government of Antigua and another sum of £1,000 by the Government of St. Kitts-Nevis for similar purposes. Contributions were also made at the outset by the British Cotton Growing Association, the Empire Cotton Growing Corporation, Messrs. Cadbury and Fry and Mr. J. W. Stephens of Trinidad.

Seeing that it is now the desire of the Governing Body of the College to extend its influence beyond the West Indies to the whole of the tropical possessions of the Empire, Lord Milner has now issued an Appeal for additional contributions and it is hoped that a further sum of £100,000 will be raised, substantial contributions to that end having already been received. The subscription list, which already contains many notable names, is published from time to time in *Tropical Agriculture*, the official organ of the College, and also in other journals.

The College has a very wide outlook with regard to the instruction which it offers to its students. It provides a three year course of study leading to a Diploma in Tropical Agriculture. This course is divided into three sections, A, B and C. Section A is intended for students who wish to become tropical planters or agricultural administrators ; Section B is intended for students who wish to become specialists in some branch of agricultural science, experiment station officers, teachers or extension workers in agriculture, while Section C is intended for those students who wish to become specialists in the manufacture of tropical plant products. In this section special attention is given to the manufacture of sugar, the College being equipped with an Experimental Sugar Factory of unrivalled completeness, capable of manufacturing sugar on a considerable commercial scale. The machinery with which this factory is equipped is remarkably complete ; it has been presented almost in its entirety by Sugar Machinery Manufacturing Firms in Great Britain.

Fourth year courses of study are offered for students who wish to specialise further in some branch of agricultural science or in chemical technology, in particular, in sugar technology.

Special consideration is given to the requirements of post-graduate students from other Universities and Colleges, facilities being provided for advanced study in connection with such subjects as Agriculture, Genetics, Plant Physiology, Mycology, Entomology, Chemistry, Chemical Technology and Economics, the work being arranged to meet the requirements of each individual student. By means of post-graduate studies it is hoped so to add to the training which has been given to students in Colleges and Universities in temperate regions as to fit them for work in the tropics and to enable these students to become much more immediately useful than would be the case were they to proceed at once to the tropics from some educational centre in a country possessed of a temperate climate without having had any tropical experience whatever.

The post-graduate courses of study have already attracted a good deal of attention and advantage has been taken of them, notably by the Empire Cotton Growing Corporation, which body has awarded a number of scholarships to students from English Universities and Colleges with the object of training these men for special work in connection with the extension of cotton growing in different parts of the Empire. Several of these students from the College are already engaged in work of this character in Nyasaland and Uganda.

Situated within the tropics in the easily accessible island of Trinidad the College offers unrivalled facilities for the training of tropical agriculturists in their several spheres, whether as actual workers on the land, engaged in cultivating and disposing of tropical crops, such as sugar, cacao, cotton, coconuts, rubber, tobacco, citrus and other fruit crops and the products of the tropics generally ; or as scientific advisers, such as chemists, plant pathologists, mycologists, entomologists, or as technologists engaged in the manufacture of tropical products, notably of sugar, for study in connection with which the College possesses unusually complete equipment.

In addition to the work of teaching, the College also serves as an Institute for Research ; investigations are undertaken by the members of the staff and the senior students with the object of making such additions to scientific knowledge as may be useful in connection with agriculture in the tropics and also with a view to exploring new fields, which are presented in such abundance in these regions.

It is evident that this College offers great attractions to those about to engage in tropical work and that its courses of instruction should result in so qualifying its students that they will embark on their life's work far better equipped than their predecessors and that their enlarged outlook and activities will have their effect in the rational development of the tropical resources of the Empire, which should derive direct benefit, while, at the same time, the agricultural work of the constituent Colonies should be advanced with greater rapidity and assurance at the hands of well trained men, many of whom it is anticipated will be alumni of this institution.

THE IMPERIAL COLLEGE OF TROPICAL AGRICULTURE.

(2) H. MARTIN LEAKE, M.A., SC.D. (Cantab.) F.L.S., *Principal.*

IN the article by Sir Francis Watts an account is given of the origin of the West Indian Agricultural College, and of the subsequent expansion of the scheme to its present Imperial status. The facilities that we offer are also described. Briefly those consist of :—

(1) A full Diploma course such as is given at a University or University College.

(2) Facilities for post graduate work.

(3) Facilities for research on problems of interest in tropical agriculture.

(4) Technical courses and especially courses in sugar technology.

The College building on which all these are to be centralised is in process of completion. It consists of a solid two-storied block constructed throughout of true steel re-inforced concrete, the risks of seismic disturbances, though not great in Trinidad, being thus provided against. It is practically fireproof, doors and windows being of steel and only the laboratory floors and jalousie slats of teak. The area covered is over 11,800 square feet with 16,900 feet actual working floor area, and a concrete-paved space under the whole building gives access to all drains, channels and service pipes. The roof is spacious, flat and paved with rock asphalt.

It is situated in a savannah of 88 acres which contains also the model sugar factory, the present laboratories, ultimately destined to be devoted to chemistry and sugar technology, the Principal's residence and 3 staff houses.

The building itself contains on the ground floor a central examination hall with one wing devoted to Agriculture and the administration offices and the other to Mycology. On the upper floor one wing is devoted to Entomology and Economics and the other to Botany both flanking the central library and reading room. A mezzanine floor at the rear of the building affords accommodation for stores, a board room and photography, while below it is a students' common room. The whole building is standardised throughout, the unit room being 12 ft. × 24 ft.; the partitions are of plaster blocks reinforced with coconut fibre laid double with an air space between to render them sound proof; they can be readily removed and re-erected giving great flexibility of accommodation.

The laboratories are well lighted, special care has been devoted to the question of ventilation and the fittings are throughout specially designed with high and low pressure water, petrol gas and electric light for general illumination and for microscopic work. The full requirements of students and research workers have been borne in mind in the provision of equipment and when completed the building will afford full facilities for all branches of work in the subjects named.

The building, substantial as it is, is but one wing of the contemplated structure, as designed by Major Corlette, which will be required if the College is to fulfil its Imperial functions. With present staff and even the completed building certain subjects of vital interest to tropical agriculture, such for instance as cattle and fruit can only be partially handled. Chemistry itself, now dealt with as one subject is readily and profitably expanded into several branches such as that dealing with the soil as such, the physiology of the growing plant, the chemistry of crop products and so on.

The main provision for technical instruction is the model sugar factory the importance of which to the College as an institution cannot be over estimated. It is the only instructional and experimental factory in the Empire and its existence is due to the generosity and foresightedness of those manufacturers who have presented practically the entire plant. It forms a balanced model on which not only can instruction be given but experimental work can be carried out. The piping system is so designed that all classes from the muscovado to refined sugar can be produced at will by changing the direction of flow of the juice. It is capable of dealing with 20-30 tons of cane in a 16-hour day. The erection is now practically complete and arrangements have been made for the supply of cane required to work the factory during the coming season.

A common criticism of Agricultural Educational Institutions is that the product is not capable of undertaking immediately that supervision of estate work for which their training is supposed to entitle them. This criticism was more frequent in the past than it is at the present time as it comes to be recognised that an institution can only prepare a student for such work. Successful management implies skilled handling of labour and other characters which are personal to the individual and can hardly be taught, and, further, in a College with numerous students, the practical difficulties in giving each actual experience of supervisory work are insuperable. Nevertheless much can be accomplished by the attachment to such an institution of an estate worked on business lines. Such an estate must be sufficiently large to illustrate practically the common methods of working land, whether directly or indirectly by tenantry, and it must be sufficiently large that the overhead charges bear a due relation to the other costs.

In this respect the Imperial College is at present deficient in equipment. The savannah consisting in all of some 88 acres, will, when provision is made for buildings, hostels and recreation grounds, provide a sufficiently large cultivated area to meet the requirements for living material for the laboratories and for research but it is totally inadequate to provide an estate as defined above. Such an estate must be, under the economic conditions of the island, some 1,000 acres in extent and should embrace as far as possible the typical agricultural conditions of the island. Such an estate is not acquired and developed without considerable initial expense but this should be reproductive expenditure if the estate be run on the lines indicated. The provision of such an estate is an accepted policy of the Governors and is merely delayed by considerations of ways and means; with it a technical course hardly second in importance to that in sugar technology will become possible for it is only now beginning to be recognised that there is a theory, as well as a practice, underlying estate management which will gain in importance as time progresses. It is the ambition of the College Authorities to be first in the field within the Empire in this direction as they already are with the Sugar Factory.

THE IMPERIAL COLLEGE OF TROPICAL AGRICULTURE.

Contributions Towards the New College Buildings.

It will be useful at the present juncture to place on record some particulars regarding the manner in which the erection of the buildings have been financed. To begin with, it should be recalled that the Government of Trinidad and Tobago generously transferred the site at St. Augustine, 84 acres in extent, to the College on a lease of 199 years for the nominal rent of 1s. per annum. Further, acting in conformity with the expressed desire of the planting community, who indicated their willingness to contribute towards the cost of buildings in this manner, the Government imposed a tax on Agricultural Produce exported from the Island. By this means a sum of £50,000 for building purposes was raised and transferred to the Governing Body.

The Government of Antigua and St. Kitts-Nevis, Presidencies of the Leeward Islands, each contributed a sum of £1,000 towards the Building Fund, while the Government of Bermuda showed its interest in the movement by contributing £100.

Messrs. Davidson & Todd, of Trinidad, have offered to furnish the entrance hall of the new building.

For the completion and equipment of the buildings and for the general purposes of the College an appeal for contributions was made by Viscount Milner, who, when Secretary of State for the Colonies, appointed The Tropical Agricultural College Committee, as the outcome of whose recommendations The Imperial College was subsequently established. It now amounts to £22,316. During Lord Milner's absence in South Africa donations are being invited by Viscount Burnham (acting Chairman of the Appeal Committee) the Earl of Derby and Lord Weir.

Towards the maintenance of the College the Governments of Trinidad and Tobago, Barbados, Grenada, St. Vincent, St. Lucia and the Leeward Islands contribute annually a sum of one-half of one per cent. of their average revenue for the preceding three years which, with an annual contribution of £1,000 voted by the Combined Court of British Guiana brings in approximately £16,000 per annum.

The British Cotton Growing Association contributed for a limited period £200 per annum and the Empire Cotton Growing Corporation £500. Messrs. Cadbury and Fry contributed the sum of £1,000 and other private contributions included one from Mr. J. W. Stephens, whose handsome contribution of £1,000 has been credited to Lord Milner's Fund.

Finally, the Imperial Government is contributing £15,000 spread over the five years 1922-23 to 1926-27 on the condition that the Imperial College of Tropical Agriculture continued the work of The Imperial Department of Agriculture during that period.

THE IMPERIAL COLLEGE OF TROPICAL AGRICULTURE.

A Note on the New Building, St. Augustine, Trinidad.

(3) MAJOR H. C. CORLETTE, O.B.E., F.S.A., F.R.I.B.A., *Architect.*

THE new College Building, now nearly completed, has been erected in reinforced concrete.

The external design and the arrangement of the Plan have been worked out on general lines that will allow for future development. This could be carried out, if it becomes necessary, by additions to the South of the present block.

The principal front of the Building faces the East, the long axis of the plan being from North to South. This arrangement on the site was adopted so that the prevailing easterly winds might move through all the Class Rooms and Laboratories to keep them as cool as possible under tropical conditions. The central block of the Building is provided with open Galleries on the East and the West sides. In the North and South wings the Galleries, at first proposed, were omitted on grounds of economy. But the windows in the outside walls of these wings are provided with external hoods, and internal venetian blinds, to give sufficient protection from the heat of the sun and the strong light of the open sky. All the windows of the various Class Rooms have been made as large as possible. This was clearly necessary for practical reasons. They were required to give ample light but in such a way that it could be under control if necessary at different times of the day. And they were also to be regarded as an essential method of ventilation. All of them can be easily opened or closed. At the sides, and also over the top of some of the larger ones, movable louvres are provided as an additional means of ventilation. But from the architectural and building point of view these big windows become a very welcome necessity. They add variety and colour to the whole structure and help very clearly to indicate the character and purpose of the Building.

In planning the internal arrangements, and in working out the external design of the elevations, it was felt from the beginning that a frank, practical, recognition of the uses for which the building would be required was essential, for no addition of "features," as they are sometimes called, or ornament, can produce a satisfactory building if its primary use and purpose is not sufficiently recognised in all architectural and structural efforts. This building therefore relies as far as possible on its actual shape and size, its form and construction, in the first instance, to produce such qualities of architecture as it may possess when finished.

The plan of the Building generally, and also that of the several Class Rooms, is flexible in character. The beams and the posts supporting these, are spaced on what might be called a regular, or unit method, and the division walls between all Class Rooms are partitions which can be easily removed to a different position if required owing to changing conditions of work in the College. All the rooms are approached from the Galleries and not from internal corridors. By this means any obstruction to the cross ventilation of the building is avoided. Some small changes in the allocation of the various rooms have been made as the scheme of the curriculum for work has developed. But this does not alter the general plan. The principal entrance is in the centre of the East front, and from the Entrance Hall the West Gallery becomes the main communication between the rooms to the North or South. A large men students, common room, nearly fifty feet long, is provided on the West. It has good lavatory accommodation and is screened from the sun by a small West Gallery or portico of its own. Above the projecting block on the West, in which this students, room is placed, there is a mezzanine floor. This contains a separate women students, common room and other rooms. The Class Rooms on the first floor follow the arrangement of those below. The library will now be in the centre above the Entrance Hall.

The flat roof of the building is covered with a hard rock asphalte in which Trinidad bitumen has been used as more desirable than Mexican or other products. The same material forms the paving of the Galleries. In either position the asphalte is laid direct on to the concrete roof or floor. The material adopted has special qualities which some of the "reconstructed" varieties do not possess. The whole of the roof surface will be white washed to increase the heat reflecting power of the asphalte. All the Class Rooms are a clear fourteen feet in height to the underside of the floor or roof beams, and in all of them it will be possible to secure freedom for the movement of air across the rooms at the ceiling levels. This should aid in keeping the ceiling surfaces at as low a temperature as possible and also to carry the lift of warmer air away as it rises from the lower levels. By this means it is hoped that two things most desirable under tropical conditions will be gained, namely, a current of freely moving air, and a constant flow of naturally impelled change in the air supplies. Inlets at the low levels, and the natural properties of air, will aid in providing a motion to induce both the current and the change.

The floor surfaces of the Class Rooms will be covered with interlocking wood blocks. Such a surface will have a long life, and there should be less noise from movement on the floors than if other materials had been used. Some sound is inevitable where concrete floors of a single slab thickness are a necessity. If acids are spilt on the

floor the wood will absorb these readily and so reduce the risk of any residues filtering through to the concrete and steel below the blocks. The structural steel bars of the floors and beams could if sufficient precautions are not observed be attacked and destroyed by these acids. Recent research has demonstrated that some patent flooring materials must be used with care for this reason. The possibility of what are described as hair cracks developing in reinforced concrete floors has not yet been eliminated. These cracks, however slight, are transmitted to the finished surfaces of the flooring material, and if certain acids have been used to harden the material artificially they may be carried through those cracks to the steel below, in the structural parts of the slab, by periodical washings on the floor.

Laboratory drainage is provided in each of the Class Rooms. All the main channels are carried in a series of double drainage beams with an even "fall" to the different outlets provided for each series of rooms. At various points these channels run through the main structural beams that carry the floors. But where they cross those beams they do so at the level of the neutral axis.

Consequently they will not reduce their carrying capacity by any interference with the steel bars or concrete taking the strains of compression and tension, or the shear stresses. The drainage beams are double for a specific reason. By this method of designing their construction it is possible to carry the channels in such a position that if any acid should chance to escape, through the bed of the drain channel, it will not come into contact with any of the structural steel in either of the beams. Risk of deflection or collapse from such a cause is therefore avoided. There will be no danger point where the channels meet, and change their direction, in the neutral axis as there are no joints in the channels where they cross the beams.

All the Laboratory drains will be easily accessible for inspection, or scouring, whether in or above the floors. Those in the floors have been provided with teak covers in short lengths, which can be lifted by flush rings at various points. And the removal of any one section of the cover will allow the waste pipe from the sinks in the benches to be inserted so as to deliver its waste into the drain below in the proper direction for its "flow" and "fall" to the outlets.

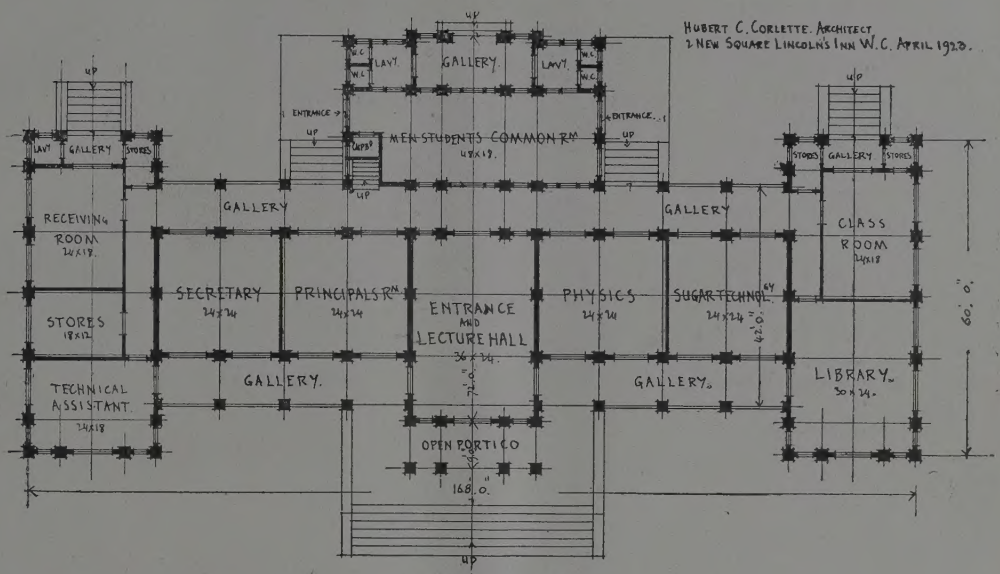
The provision of drain channels in all the Class Rooms was decided upon for practical reasons. It may be that in some rooms drainage will not be necessary at the present stage. But, if conditions change, and the use of any room is altered the drains will be ready and available without expensive alteration. The principle in view was to continue the idea of flexibility into this detail of Laboratory arrangement. It allows both for development and change in technical processes to be adopted in any room, or series of rooms. And it also permits the placing of benches for various experimental purposes in alternative positions either against the walls or on the area of the floor. From what has already been described it will be seen that it was essential to study accurately, at the early stages of planning this educational workshop, all questions concerning the type, use, shape, and size of the fittings and furniture that might be required. Those now in use in several different scientific institutions were carefully studied in detail, the object being to discover, and take advantage of, past experience and recent experiments in such matters. Certain principles generally applicable were observed. In some instances, costly and complex unnecessary detail was recognised as something undesirable and avoidable. Valuable experiments in extremely simple and direct, practical, and adaptable unit systems were examined with satisfactory results. And so far as possible a suitable and flexible type of Laboratory fittings and furniture is now being devised in detail. These will, it is hoped, meet the special requirements of the new College, the foundation of which must have a wide influence on the future of scientific research, and its practical application in the economic development of Tropical Agriculture in every part of the Empire. No less than the kindred subject Tropical Medicine, it will be a prime factor in affecting the stability of industry in the Tropics, with its reflex influence on that of say the Manchester cotton mills, or the itinerant vendor of West Indian bananas in The Strand.

Perhaps it is not extravagant to add that the College is but the small beginning of a great new constructive enterprise based upon and supported by a free personal and corporate initiative. It must in time bring into clearer evidence the dependence of the health, or the wealth, of any part of our great Commonwealth, on accurate scientific knowledge, and energetically applied skill, and it will help to show that the prosperity of the whole is intimately related to the welfare, the well-being of any of its very various and widely distributed parts.

Printed by the Government Printer, Trinidad, B.W.I.

PLAN OF THE NEW BUILDING.

(N.B. The allocation of the rooms between the various faculties has been slightly altered to meet administrative requirements.)



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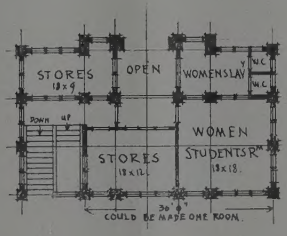

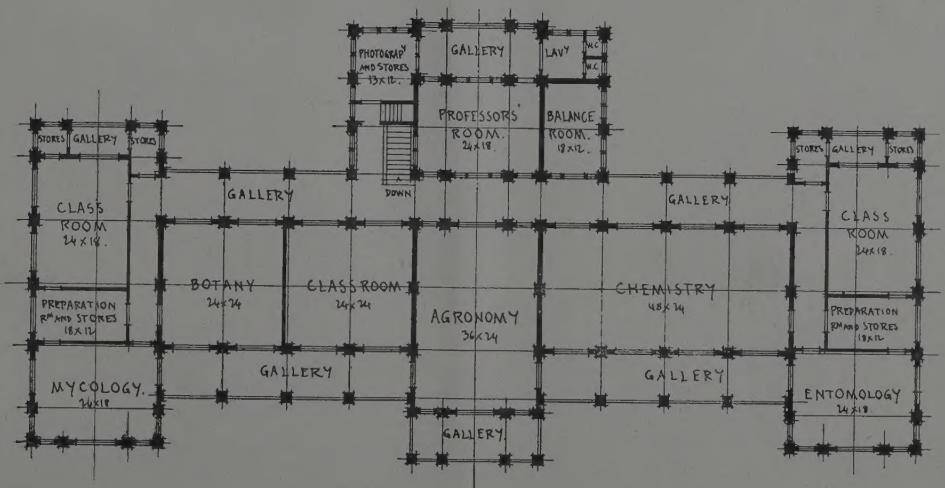

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